Early life intelligence and adult health - Associations, plausible mechanisms, and public health importance are emerging

derived from computer modelling, from the extrapolation of data from sentinel antenatal surveys, and from the national mortality registry.[6] Notably, the prevalence in the study rises to 15.5% (13.5 to 17.5) for the adult population defined as those aged 25 years and older.

In a separate investigation commissioned by the South African health ministry in 2002 looking at the impact of HIV and AIDS on the health sector, the South African Human Sciences Research Council's team found an alarming HIV seroprevalence among professional healthcare workers of 15.7% (12.2 to 19.9).[7] Although based on a relatively small sample of 595 subjects, the results show that the prevalence among health professionals is not dissimilar to that of the general adult population. The study does not provide a differential breakdown of the prevalence among the various professionals but notes that "African health workers had a much higher prevalence of HIV than other race groups."

The investigators conclude that "the HIV/AIDS epidemic will have an impact on the health system through loss of staff due to illness, absenteeism, low staff morale, and also through the increased burden of patient load."

The impact is already with us—the nursing profession is the most affected—but secrecy and silence continue to prevent us from getting the facts. A recent report from McCord Hospital, well regarded for its community orientation and as a teaching facility, records how an initiative to reach out and to create a supportive work environment for HIV affected staff following the death of four staff members in four months was met with denial, fear, hopelessness, and an unwillingness to be tested or treated.[8] The hospital subsequently succeeded in establishing a trusted and well used diagnostic and treatment programme for its staff.

Three waves have been described in the natural course of the HIV epidemic,[9] the depth and duration of which can of course be moderated by the effectiveness (or lack thereof) of interventions for modifying sexual behavioural and antiretroviral treatment: firstly, an expanding incidence of new cases, which in South Africa is deemed to have peaked around 1998; secondly, increasing prevalence thought to be peaking around now; and finally, increasing mortality.

In South Africa, and much of sub-Saharan Africa, mortality is currently spiralling upwards. Ironically, a stronger health system is necessary for more effective prevention and care of HIV and AIDS,[10] which the attrition among health professionals will only serve to undermine. Holly Burkhalter, of Physicians for Human Rights, writes in the *Washington Post* of 12 June 2004 about the brain drain in Africa that "today's biggest limiting factor for AIDS treatment in the developing world is the paucity of trained health workers… We're going to run out of people before we run out of money."[11] The same might well be said of AIDS related mortality among health professionals.

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Early life intelligence and adult health

Associations, plausible mechanisms, and public health importance are emerging

Tests of psychometric intelligence (IQ-type tests), introduced about a century ago, have traditionally been used in educational and workplace settings. Only in the past decade has their predictive capacity for non-psychiatric health outcomes been examined in the rapidly evolving field of cognitive epidemiology. The health outcome most commonly examined in relation to people's differences in measured intelligence is all cause mortality. Cohort studies of older people indicate that those with higher intelligence scores experience a lower risk of mortality.[1] A problem with examining the association between IQ and mortality in these age groups is the cognition lowering effect of comorbidities, which might explain the apparent protective effect of high intelligence scores against premature mortality.

To address the comorbidity issue, investigators have recently started to link results from intelligence tests taken in early life with adult mortality. Findings are highly consistent—people with a higher IQ in childhood live longer.[2–8] In studies that report comparable statistics,[4 6–8] the hazards ratios for total mortality, comparing the groups with the lowest and highest intelligence scores, range from 1.4 (95% confidence interval 0.9 to 2.0)[7] to 1.9 (1.4 to 2.6).[4] Moreover, the association between IQ and mortality seems to be incremental, not solely generated by the typically poor later health outcomes of people with learning

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disabilities, who represent a sizeable proportion of the groups scoring lower for intelligence.[4 6 8]

These results have recently been advanced in important ways by an examination of the association between pre-adult intelligence test scores and disease specific mortality and morbidity. Extended follow ups of the 1932 and 1947 Scottish mental surveys find that individuals scoring higher on a well validated mental test at age 11 had fewer total hospital admissions and were less likely to develop coronary heart disease, some cancers, and high blood pressure in adult life.[3 8 9]

Several non-exclusive explanations for the association between IQ and mortality have been advanced.[2] They include measured intelligence representing: an archaeological type record of psychological and physiological insults (for example, birth complications, suboptimal postnatal care, illness); a predictor of advantageous social circumstances in later life (high educational attainment, high job status); an intrinsic indicator of general body integrity (as measured via the brain's capacity to process information rapidly, correctly, and reliably); a proxy for stress management skills—people with higher intelligence scores may be less likely to place themselves in stressful environments or cope better if they do. Another hypothesis concerns the acquisition of behaviours conducive to health (not smoking, more physical activity, prudent diet, avoidance of accidents). Supporting this, recent findings imply an increased likelihood of children who scored highly in intelligence tests to give up smoking in adult life.[10]

Some of these explanations for the association between IQ and mortality have started to be tested empirically. In analyses that have taken into account the potential confounding effect of birth complications (as indexed by low birth weight),[6] illness in childhood, and cigarette use at age 26,[7] the risk of total mortality remains raised in the lower scoring intelligence groups. Studies vary in the degree to which controlling for socioeconomic position alters the magnitude of the apparent health preserving effects of a high mental test score. Although this issue has yet to be resolved, early indications are that adjustment for social conditions in childhood (typically indexed by paternal occupational social class) has an only minimal effect on the magnitude of the relation between IQ and mortality.[4 6 7] Some attenuation is found, however, when social circumstances in adulthood are taken into account.[7 8] That the influence of pre-adult intelligence on later mortality might be mediated partly through social factors in adulthood may be unsurprising, implying a protective chain of events. High intelligence in childhood is likely to lead to educational success, placement into well paid employment, enhanced social status, and the accompanying benefits to health that the latter has repeatedly been shown to confer. Other investigators have argued that this causal pathway is only one possibility, no more plausible than the converse—measures of social position might be indicators of cognitive differences, which themselves affect health outcomes.[11]

Another mechanism that may underpin the apparent benefit conferred by high intelligence scores in childhood in relation to mortality in later life concerns the self management of treatment, clearly a cognitive task, in people experiencing illness. Thus people of low literacy or educational attainment (both are strongly correlated with psychometric intelligence scores) are less likely to understand instructions for use of medicines, recognise when their condition requires corrective intervention (for example, unfavourable blood sugar concentrations in people with diabetes), know the appropriate actions to take,[11] seek rapid medical advice upon onset of common chronic illnesses (for example, a myocardial infarction), and receive treatment at a medical facility most appropriate for their clinical needs.[12] The latter observations have been made in Scandinavian countries, which offer equity of healthcare delivery.

Given their inherently complex and sometimes conflicting nature, healthcare messages, treatment regimens, and preventative strategies perhaps surpass the cognitive abilities of some people.[11] If this is the case—and bearing in mind that oversimplification of advice might reduce effectiveness substantially—proactive involvement of healthcare providers is warranted to reduce health inequalities attributable to differences in cognitive ability.

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